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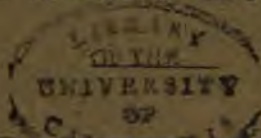
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THE UNIVERSITY OF KANSAS

PUBLICATION OF

THE SCHOOL OF EDUCATION.



A TEACHERS' MANUAL

FOR THE USE OF

THE BINET-SIMON SCALE OF INTELLIGENCE.

By **RAYMOND A. SCHWEGLER, M. A.**
Associate Professor of Education.

1914.

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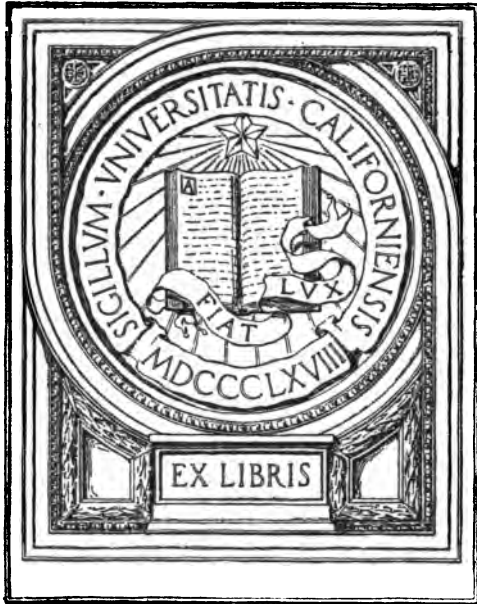
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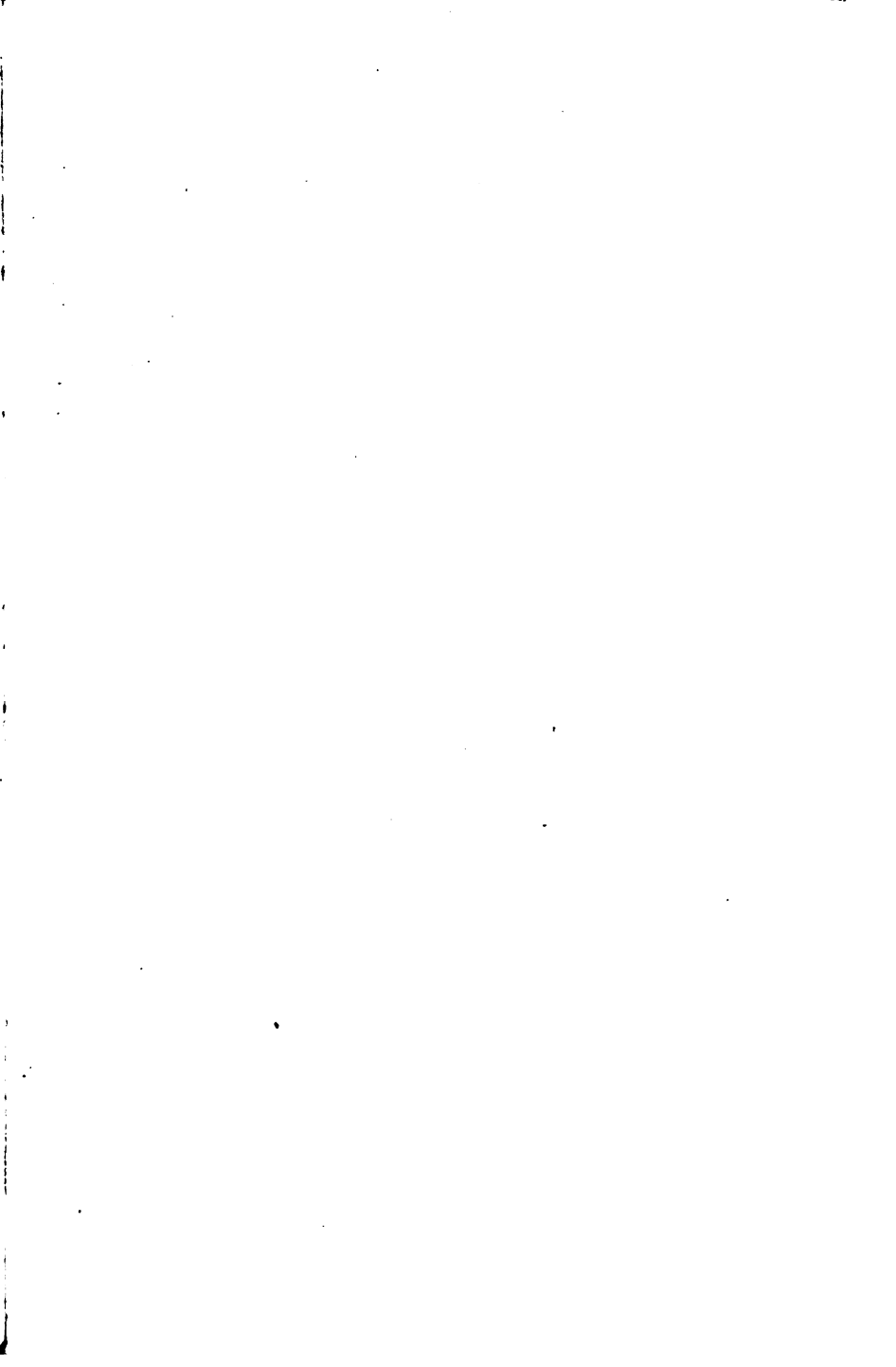


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PREFACE.

The Binet-Simon scale for intelligence testing has now passed its first days of hesitant uncertainty. In spite of doubt and controversy it has commended itself to a large number of earnest students of childhood as altogether the most adequate measuring rod of intelligence so far devised.

That the scale is perfect no one pretends. It is, however, noteworthy that those who have used it most extensively are, on the whole, its most ardent defenders. That it will in the course of time be amended and developed is highly probable. In fact, the earnest enthusiasm of the splendid group of workers now active in this field, both in America and abroad, gives assurance that this development will be both early and sound.

In the meantime it remains undoubtedly true that the scale as at present constituted is our most available and reliable guide in distinguishing the normal from both the subnormal and the exceptional child, in determining the various degrees of natural endowment, and in reaching final judgment in many complicated phases of juvenile life.

The teacher, the parent, the social worker and the juvenile court should find in this scale an invaluable instrument for the solution of many a complex problem.

The purpose of this booklet is to make the Binet-Simon scale available in popular form to the great army of men and women active in public and semi-public positions in the care and control of childhood. All controversy has been ignored in the conviction that what is now needed is a practical guide for the wide use of these tests. Those whose interests are centered in the disputed aspects of the Binet-Simon tests are referred to the bibliography at the end of this pamphlet.

The series as here presented is in the main a duplicate of Dr. Henry H. Goddard's version. A few modifications, based in part on the experience of the writer, and in part on that of other workers in the field of testing, have been made. These modifications will be found chiefly in the tests suggested for the last two age groups.

The list of writings which have been consulted in constructing this guide is too long to bear detailed repetition here. Three

names stand out preëminently: Goddard, Wallin and Meumann. Grateful acknowledgment is hereby made to these and all others whose work has been of service in making this guide possible.

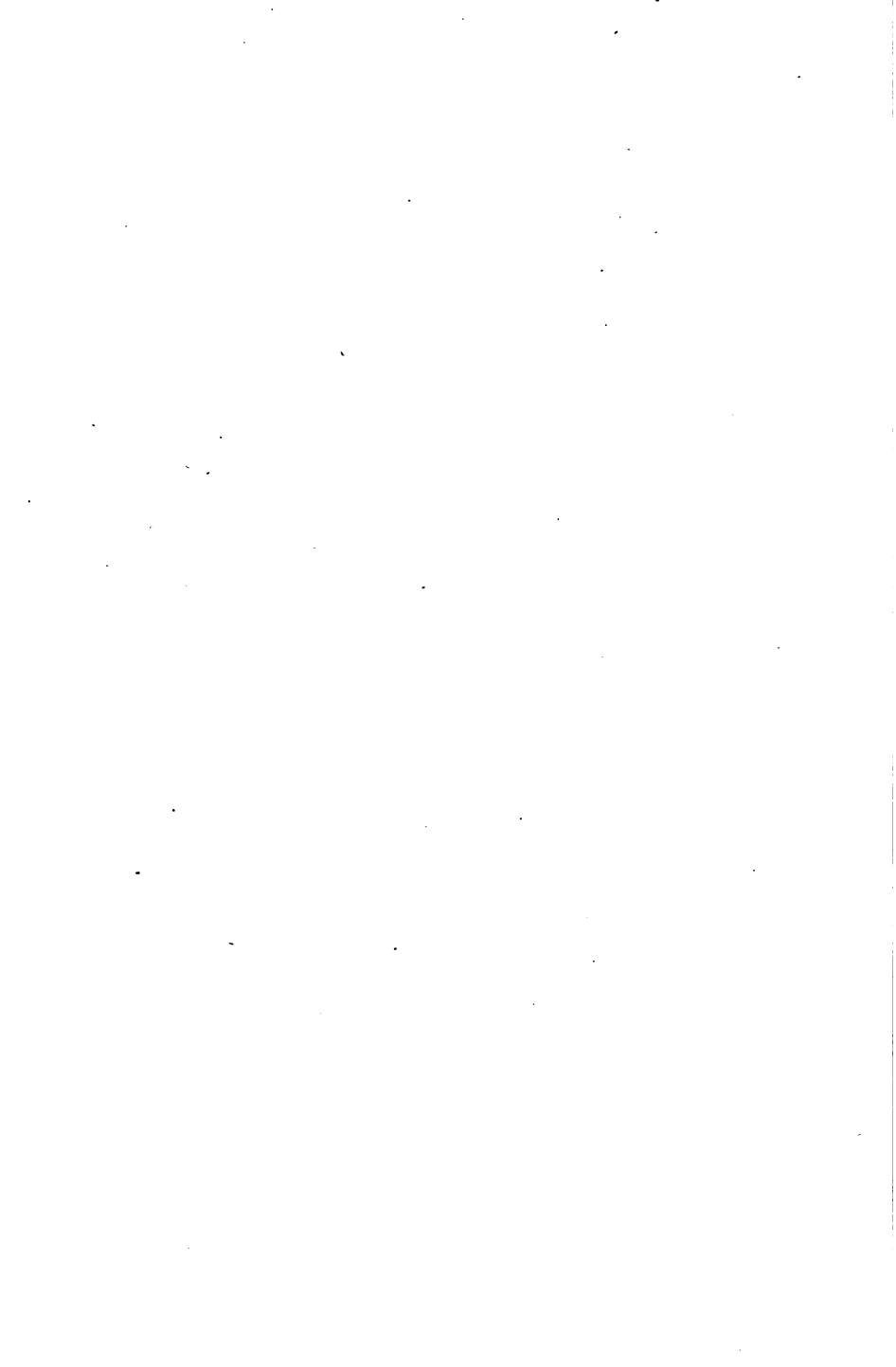
The pamphlet is dedicated to the welfare and happiness of childhood everywhere.

THE AUTHOR.

JULY, 1914.

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CHAPTER I.

A Brief Historical Sketch of the Binet-Simon Scale of Intelligence Tests.

In 1904 the minister of education of France resolved upon the separation of the normal from the subnormal children in the public schools of that nation. He turned to Alfred Binet, who had been for many years engaged in the task of developing psychological tests, for some system of tests that might be used for the task in hand.

It was in 1905 that Binet, working with Thomas Simon, promulgated a set of thirty tests, which were to be effective chiefly in the detection of mental subnormality.

After trying out his first series of tests on some 203 children in the schools of Paris, both Binet and Simon came to the conclusion that it would be entirely possible to devise a series of tests which would not only be effective in detecting mental deficiency, but which would also serve as a definite measure of relative mental unfoldment. They therefore in 1908 published a new scale, containing this time fifty-six tests, arranged in groups of varying extent, each group containing a number of tasks conceived to involve function-norms for a given age. Groups were arranged for each age from three to thirteen.

In response to much pressure, many suggestions and some personal experiences of their own, the authors in 1911 published a third scale, being a revision of the second, in which the tests were in some cases redistributed, and in others changed entirely. Shortly after, Professor Binet died.

The scale in this final form, and in the main unchanged, lies at the basis of the present pamphlet.

It may be of interest to say that the scale has been widely used in almost every country of Europe and in America, and that in spite of certain inherent difficulties, which no one has yet succeeding in removing, it is commending itself within its own limits to the favorable attention of many of the foremost workers in the field of psychometry both at home and abroad.

CHAPTER II.

A Tabular Synopsis of the 1911 Revision of the Binet-Simon Scale as Adapted to American Conditions.

The normal child should be able to perform the tasks below, up to its age level.

AGE III.

1. Points to its mouth, nose and eyes.
2. Repeats correctly any easy sentence of six syllables.
3. Repeats any number containing two digits.
4. Describes pictures by naming familiar objects contained in them.
5. Knows its own family name.

AGE IV.

1. Knows its own sex: "boy or girl."
2. Recognizes and names correctly a knife, key and penny.
3. Repeats any number containing three digits.
4. Compares two lines differing in length by three-eighths inch.
5. Answers questions involving simple concrete situations. (Terman.)

AGE V.

1. Compares correctly two weights of 3 and 12 or 6 and 15 grams, respectively.
2. Copies with a pen a figure one and one-half inches square.
3. Repeats correctly, after once hearing it, a sentence of ten syllables.
4. Counts correctly four pennies.
5. Reconstructs a rectangular card cut into two triangles.

AGE VI.

1. Knows whether it is morning or afternoon.
2. Defines, in terms of use, the words: fork, table, chair, mama, horse.
3. Executes triple command, *e. g.*, places key on chair, brings box, and shuts door, *exactly in the order given.*
4. On demand shows his left ear and right hand.
5. Chooses correctly the prettier of two faces.

AGE VII.

1. Counts without error thirteen pennies.
2. Describes pictures in terms of actions and scenes.
3. Observes omission of parts of pictures presented for criticism.
4. Copies diamond-shaped figure.
5. Names colors: blue, green, red, and yellow.

AGE VIII.

1. Compares from memory two terms such as window and door, paper and cloth, wood and glass.

2. Counts backward from 20 to 1.

3. Repeats the days of the week in their order.

4. Knows the cost of stamps. (1, 1, 1, 2, 2, 2.)

5. Repeats correctly numbers containing five digits.

AGE IX.

1. Makes correct change (25c.—4c.).

2. Defines simple words in terms better than use.

3. Knows the date.

4. Repeats the names of the months of the year in order.

5. Arranges five unequal weights in correct order.

AGE X.

1. Knows all the current pieces of money from 1 cent to \$5, inclusive.

2. Reproduces designs from memory, after ten seconds exposure.

3. Repeats correctly numbers composed of six digits.

4. Answers intelligently questions involving comprehension of simple situations.

5. Uses three given words in two sentences.

AGE XI.

1. Discovers absurdity in statements involving contradiction.

2. Uses three given words in one sentence.

3. Gives sixty words by free association in three minutes.

4. Gives three words rhyming with a given word in one minute.

5. Reconstructs dissected sentence of eight words.

AGE XII.

1. Repeats correctly numbers containing seven digits.

2. Defines abstract terms: goodness, justice, charity.

3. Repeats correctly a sentence of twenty-six syllables when heard once.

4. Resists suggestion by lines of unequal length.

5. Discovers logical inferences in simple statements.

AGE XV.

1. Interprets pictures.

2. Visualizes clock with hands reversed.

3. Writes three-word sentence in "Civil War code."

4. Names opposites to seventeen out of twenty given words.

5. Gives generalized interpretation for a fable. (Terman.)

ADULT

(over 15)

1. Visualizes and describes result of cutting folded paper.

2. Notes the difference in meaning of abstract terms.

3. Solves a concrete situation of complex character. (Schwegler.)

4. Reproduces the sense of a selection read to him.

5. Resists direct suggestion. (Meumann.)

Grade the child's mental age on the basis of the highest age of which it passes *all* the tests. Allow one additional year for every five further tests passed.

CHAPTER III.

General Directions for Testing.

1. The testing must be done in a comfortable, well-lighted room that is free from noise and interruptions.

2. See that the child to be tested is in every way comfortable. Headache, earache, toothache and other minor physical ailments, if present, as also fatigue, hunger, thirst and other physical necessities, will distract the child's attention and nullify the value of the tests.

3. Put the child at its ease. Make the testing as informal and spontaneous as possible. Embarrassment and fear are fatal to success.

4. Encourage the child by look, attitude and word. Make him feel that you hope that he will succeed. You are measuring him at his best, not tripping him at his worst.

5. Give the child the benefit of the doubt. If it seems probable that he might do better with another trial, change your material and repeat the test, except where one trial only is specifically allowed.

6. If there is any doubt as to the visual and auditory efficiency of the child, test these functions before proceeding with the scale.

7. Unless the child is thoroughly familiar with the English language test him by the use of his mother tongue, if possible.

8. *Watch, note and record* every move and utterance which the child makes. Many automatic postures and movements are symptomatic. Often the *manner* in which an answer is given is of more importance than the *content* of the reply.

9. The testing must be done individually. Never test in groups, nor in the presence of other persons if it can be avoided.

10. Make yourself thoroughly familiar with the test and its conditions before attempting to apply it seriously.

11. Test extensively both above and below the age passed. Wide-range testing will give interesting side-lights on the special weaknesses and capacities of the child.

12. The following symbols are suggested for use in marking the records:

(+) The plus sign=passed.

(—) The minus sign=failed.

(±) The plus-and-minus sign=value of answer uncertain.

(!) Exclamation mark=absurd response.

13. All the material required for the administration of the Binet-Simon scale as outlined in this guide may be purchased in standard form from C. H. Stoelting & Co., 21 N. Green street, Chicago, Ill., at a nominal price.

14. It is suggested for the advantage of those who prefer to make their own apparatus, and more especially for the benefit of those who wish to reduce the individual tests to 4 x 6 in. card form as recommended, that each card ought to be marked on the upper right-hand corner with the Roman numeral of the age, and the Arabic numeral of the test. Thus: XII:4 would be test 4, age XII. In case a given test demands more than one card, mark them with letters (a, b, c, etc.) in addition. The use of the tests will be greatly simplified by following the suggestion. Provide a shallow box in which all material needed for the administration of the tests may be kept together and ready for instant use.

CHAPTER IV.

A Verbatim Guide to the Use of the Binet-Simon Scale.

For many reasons it is highly desirable that a standardized method be followed in administering the Binet-Simon tests. This is especially true when it is proposed to place the tests into the hands of a great body of teachers untrained in the special technique of mental testing; for except as a uniform standard be followed, there can be no uniformity of testing and therefore no uniformity in, nor comparability of, results.

A guide, containing in compact form verbatim instructions for the administration of the Binet-Simon scale is herewith presented, in order that teachers and others following it may proceed to the task of examining their charges with reasonable confidence in the reliability of their results.

Every effort has been made to remove obscurity in the statement of the tests themselves, in the enumeration of the materials required for them, in the specifications of the time factor wherever it was involved, and in the discussion of the accepted standards of grading and of such other interesting and important factors as seemed to have a bearing on the interpretation or administration of the individual tests.

Since this guide is intended primarily for teachers of public school children, the tests for age I and age II are omitted.

AGE III.

Test 1.—*Locates Mouth, Eyes and Nose on Request.*

Material.—None required.

Method. Ask the child: "Where is your mouth?" "Touch your nose." "Close your eyes."

Time. The response should be immediate. Hesitation may be due to shyness or embarrassment, or to failure to comprehend the question.

Record: + if the parts are *all* correctly indicated.

Note. If the child fails, it may be due to the factors named above, or to real defect. In any case it ought to put the examiner on his guard. Some children are exceedingly slow and uncertain in their responses. Note the fact that it occurs.

Test 2.—*Reproduction of Six Syllables.*

Material. A card 4 x 6 inches on which are written clearly the sentences given below, or others of similar length and difficulty.

Method. "Let me see if you can repeat what I am going to say, just as I say it. Now listen carefully: (a) Mama has some candy. (b) Don barks when he is glad. (c) Now the sun is shining." No prompting and no repetition allowed.

Time. The response should be immediate. Delay makes success difficult and unlikely.

Record: + if the child repeats verbatim one out of three sentences.

Note. The quality of enunciation, the vigor of utterance and possible motor indications of psychic strain should be noted.

Test 3.—*Reproduction of Two-place Numerals.*

Material Required. A card containing five numbers of two nonconsecutive digits each.

Method. "Please listen carefully, and say these numbers after me just as I say them. Ready? Now! First trial, 3, 8; second trial, 5, 7; third trial, 9, 2. The two digits should be pronounced by the experimenter once slowly, distinctly, without accent, about one-half second apart.

Time. The subject should be required to repeat the number at once.

Record: + if one of the two-place numbers is correctly reproduced.

Note. Observe whether the reply is sure or uncertain and hesitant, and whether the failures consist of substitution of wrong digits, or of transposition, or of absolute inability to recall.

Test 4.—*Enumeration of Pictured Objects.*

Material Required. Three or four pictures of people in familiar situations.

Method. "Here is a picture which I would like to have you look at. What are all the different things you see in it?" Children of three usually *enumerate* objects found in pictures; they *do not describe or interpret*. If necessary, urge the child to name additional omitted items prominently contained in the picture.

Time. No absolute time limit can be set for this test. However, the facility with which the child reacts may sometimes serve as an important diagnostic sign.

Record: + if the child enumerates or names the major part of the prominent elements contained in the picture.

Note, if the child reacts easily or with difficulty and embarrassment, and whether he recognizes familiar objects readily or only when specially urged. (At age three children enumerate, at seven they describe, and at twelve they interpret.)

Test 5.—Knowledge of Family Name.

Material Required. None.

Method. "What is your first name?" "And now, what is your last name?" The family name is the desired reaction.

Time. Response should be immediate.

Record: + when the child gives the family name correctly.

Note. All children of three know their first name, but not all of them know their family name.

AGE IV.**Test 1.—Knowledge of Own Sex.**

Material Required. None.

Method. "Which are you, a little boy, or a little girl?" If the subject is a boy, use the formula above given; if a girl, reverse the words "boy" and "girl."

Time. Response should be immediate.

Record: + if the child gives its sex correctly.

Note. Children of three frequently do not know their own sex, while at four they always do.

Test 2.—Recognition of Familiar Objects.

Material Required. A key, a pocket-knife, and a penny, to be shown successively.

Method. "What is this I am pointing at?" or "What do you call this?"

Time. The reaction should be given at once.

Record: + if the child names the object correctly.

Note. Sometimes the child may have difficulty in finding the correct word at once, and may then assist itself by interpretative actions, showing that it knows the use of the object. Accept such response as pass.

Test 3.—Three Digits Reproduced.

Material Required. A card, containing five three-place numbers. The numerals must be non-consecutive.

Method. "Here are some numbers. See if you can say them after me just as I say them. First trial, 3, 7, 4; second trial, 2, 9, 5; third trial, 5, 2, 8. The child is expected to reproduce correctly three digits after hearing them pronounced once. Pronounce the numbers in distinct, clear tones, at the rate of one-half second per digit.

Time. The reproduction should be made at once.

Record: + if the child succeeds in repeating correctly in one trial out of three.

Note whether the repetition is quick and certain, or whether it is hesitant and uncertain. If the child fails, observe whether it shows a tendency to substitute wrong numerals, or whether memory is blank.

Test 4.—Comparison of Two Lines.

Material Required. A white card 4 x 6 inches. Draw on it with ink two heavy parallel lines, one inch apart. Let the lines be 2 inches and $2\frac{3}{8}$ inches in length respectively.

Method. Pointing to both of the lines at once, ask the child: "Which of these two lines is the longer?"

Time. The reply must be made at once.

Record: + if the child points out the desired line without hesitation. Hesitation counts as failure.

Test 5.—Simple Contingencies.

Material Required. None.

Method. "What do you do when you are hungry?" "What do you do when you are thirsty?" "What do you do when you are cold?"

Time. The replies should be given with reasonable readiness. One minute may be allowed for each question.

Record: + if the child answers correctly two out of three questions.

Note. This test is adapted from Terman's suggested modification of the Binet-Simon series. The original Binet-Simon series has only four tests for age IV.

AGE V.

Test 1.—Comparison of Two Weights.

Material Required. Four weighted blocks of wood, weighing respectively 3, 6, 12 and 15 grams each. The blocks must be of equal size and of similar appearance. Small tin salve boxes loaded with paste white lead to correspond to the weights given above may be used instead of the blocks of wood.

Method. Place the 3 and 12-gram weights before the child. Then ask: "Which of these two weights is the heavier. These weights look alike, but one is heavier than the other." Next try the 6 and 15-gram weights in the same manner. The experimenter may show the subject how to lift the weights by holding them one at a time between the thumb and index finger, and lifting them about one-half inch. Give three trials.

Record: + if the child judges correctly in two out of three trials.

Note the character of errors which appear. The comprehension of what is wanted seems to be much more difficult than the actual discrimination of the weights. The experimenter

should make sure that the child knows what is expected of him. Goddard found that 94 per cent of normal children passed this test at age five. Six per cent failed.

Test 2.—Copying of a Square.

Material Required. A card 4 x 6 inches, bearing a square 1½ inches on a side, drawn with heavy inked lines. (India ink is best for this and subsequent drawings.)

Method. "Here is a drawing which I want you to copy. See how well you can do it." The subject must use pen and ink in executing the test.

Time. Should be recorded for future reference.

Record: + if the subject succeeds in producing a figure that preserves fairly a squared appearance, with well marked right angles. In the figure below, numbers one, two and three are acceptable, while the remaining three are failures.

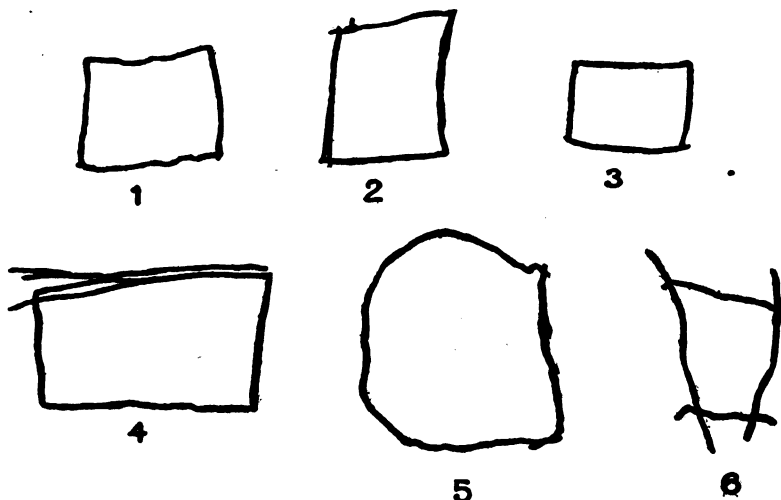


FIGURE 1

Note. Sixty-nine per cent of normal five-year-old school children examined by Goddard passed this test.

Test 3.—Repetition of Ten-syllable Sentence.

Material Required. A card 4 x 6 inches with three simple sentences of ten syllables each, like those below, plainly written.

Method. "Listen! I want you to repeat what I am going to

say, just as I say it. Now: (a) It rained all day long, and spoiled our picnic; or (b) John is going to school with his new book; or (c) In summer we find plenty of flowers." The experimenter should pronounce the sentence *once*, slowly, and in a clear, distinct voice.

Time. The reproduction should be given without delay.

Record: + if the child succeeds in repeating verbatim one sentence out of three trials.

Note. Failures are caused by positive failure to recall, by omissions, or by substitutions. Observe whether the reproduction is accomplished easily and positively, or in a halting, hesitant manner.

Test 4.—Counting of Four Coins.

Material Required. Four bright pennies.

Method. The experimenter places the pennies in a row on the table, one-half inch apart, and near the child: "Do you know what these are?" (If the child does not know, inform him.) "Now how many of the pennies are there? Count them aloud, and touch each one with your finger as you count."

Time. The reaction should be given promptly. Delay and hesitation are suspicious.

Record: + if the child counts the four pennies in order, without omissions or double countings.

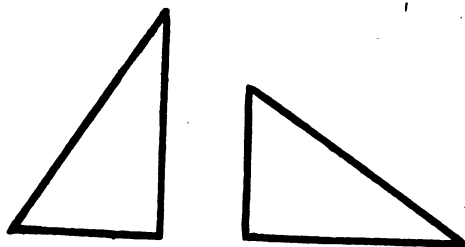
Note. A certain type of defective child tends either to be unable to count at all, or, having learned to count, to use the numbers aimlessly, and without reference to definite concrete objects. Goddard found that 88 per cent of normal five-year-old school children could pass the test.

Test 5.—Reconstruction of Rectangle. "Patience."

Material Required. Two rectangular cards, 2 x 3 inches, one to be cut into two triangles along one of its diagonals.

Method. Place the uncut card upon the table before the child. Then arrange the two triangular pieces nearer to the child as indicated in the diagram below (fig. 2). "Now push these two pieces around, until they look like that other card. See how quickly you can do it."

See that neither of the triangles becomes turned over, otherwise it is impossible to reconstruct the rectangle. Replace the triangles to their original position if it happens, and start over. With some children it may be necessary to repeat the instructions, and even to suggest moving the triangles about; but the experimenter should be careful not to indicate by look or word whether the child is succeeding or failing.

**Fig. 2**

Time. Record the time required to complete the test, and, also, the number of starts needed to accomplish success.

Record: + if the child succeeds in reconstructing the rectangle.

Note. Whether the child is eager and alert, or sluggish and indolent, whether its actions are deliberate or random and planless, and whether there are any indications of motor instability. Goddard's investigations show that 62 per cent of normal five-year-old school children pass the test successfully.

AGE VI.

Test 1.—Temporal Orientation.

Material Required. None.

Method. Ask the child: "Is it morning or afternoon now?" In alternative questions it has been shown that a certain type of child tends always to select the last of two alternatives. The question should therefore obviously be so arranged as to place the erroneous term at the end of the question. In asking the question both terms should be equally emphasized.

Time. The reaction should be immediate. Hesitation and uncertainty, however indicated, are suspicious, and should be followed by repeated questioning, until it is certain that the child really knows.

Record: + if it is evident that the child knows.

Note. Children do not, as a usual thing, succeed in answering this question until they are six. Success depends directly upon the ability to measure objective experience in terms of subjective reactions. Goddard reports 71 per cent of six-year-old normal children as succeeding in this test.

Test 2.—Definition of Five Familiar Terms.

Material Required. None.

Method. "You know what a fork is? Of course you do. Now I want you to tell me, just what is a fork?" Proceed in like manner with the remaining four terms: table, chair, horse, mama. (The following five alternative terms have also been suggested: spoon, bed, drum, cow, father.)

Time. No exact time limit within which the definition must be given can be set. The child should be encouraged to try until he either succeeds, or shows clearly that the task is beyond him.

Record: + if the child defines at least three out of five terms by stating their use, or the materials or parts of which they are composed; e. g., "A chair is to sit on."

Note. The replies should be recorded verbatim. At six years the child defines in terms of use or composition, at nine he begins to define in "terms better than use," i. e., by classifying. Before the age of six most children answer either by silence, repetition of the term to be defined, or by some descriptive gesture. The highest type of logical definition does not appear until approximately the twelfth year. Goddard finds that 85 per cent of normal six-year-old children pass this test satisfactorily.

Test 3.—Simple Triple Command Executed.

Material Required. A key, two convenient chairs, a small box on one of the chairs, and an available door.

Method. "I want you to do something for me, please. Put this key on that chair, then shut (or open) that door, and then bring me the box you see over there on that other chair. Remember now: first the key on that chair, then shut the door, then bring me the box. You understand? All right, go ahead!"

Time. The order should be carried out promptly, and without further aid or suggestion.

Record: + only if the child carries out the three orders correctly.

Note. Children for the most part can not carry out a complicated chain of instructions until they reach the age of six. Even at that age many children show marked hesitation and striking defects of memory and comprehension. Note such if they occur. Almost no four-year-old children can pass this test. At six years about 78 per cent of normal school children succeed. (Goddard.)

Test 4.—Knows Right and Left Sides of Own Body.

Material Required. None.

Method. "Show me your right hand!" After the child has shown the right hand, "Now show me your left ear!" Be sure to give no clue by look or gesture that may guide him in his choice.

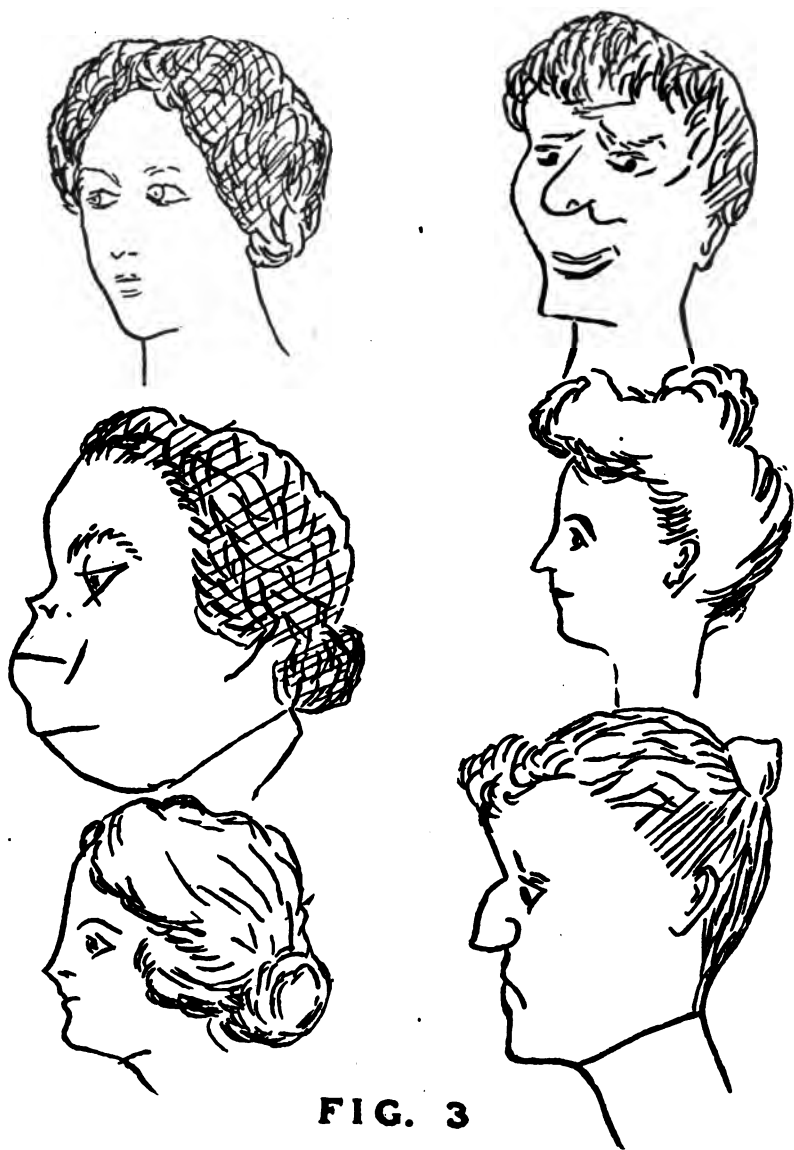


FIG. 3

Time. The reaction should be prompt, though a quickly corrected hesitation is not infrequent.

Record: — if, as is not unusual, the child clearly does not know; + if the child at first shows either the wrong hand or ear, but quickly corrects itself; + if the child correctly shows the desired hand and ear.

Note. Right-handed children have a natural tendency to show the right hand whenever that hand is called for. If the child does not know right from left, it will tend therefore for the same reason to point to the right ear. With left-handed children the reverse will be true. A few children, probably with a tendency to ambidexterity, in blank uncertainty touch one hand with the other in such a way as to leave it uncertain as to which hand is meant. Eighty-one per cent of normal six-year-old children should pass this test. (Goddard.)

Test 5.—*Esthetic Judgment.*

Material. A set of three pairs of faces drawn in outline. (See fig. 3.)

Method. Show only one pair of faces at a time. "Which of these faces is the prettier?" "And now which of these?" etc.

Time. Judgment normally should be rendered without delay.

Record: + if the subject gives a correct judgment in all three cases.

Note. At five years of age one-half of all normal children are unable to pass this test, while at six Goddard found that about 78 per cent passed. If the child has difficulty with the test, note distinctly whether it is due to inattention or to inability to form an esthetic judgment.

AGE VII.

Test 1.—*Counting Thirteen Coins.*

Material: Thirteen pennies, placed in a row, about one-half inch apart. (For purposes of availability they may be cemented to a strip of gray cardboard or thin wood.)

Method. Point to the pennies and say: "You see this row of pennies. Count them and tell me how many there are. You had better touch each one with your finger, so as to make sure not to make any mistake."

Time. The test should be accomplished quickly. No coin must be touched twice, and none omitted.

Record: + if the subject succeeds in counting all the coins correctly; otherwise —.

Note. A certain type of child passes its fingers erratically from coin to coin, without any definite connection between coin,

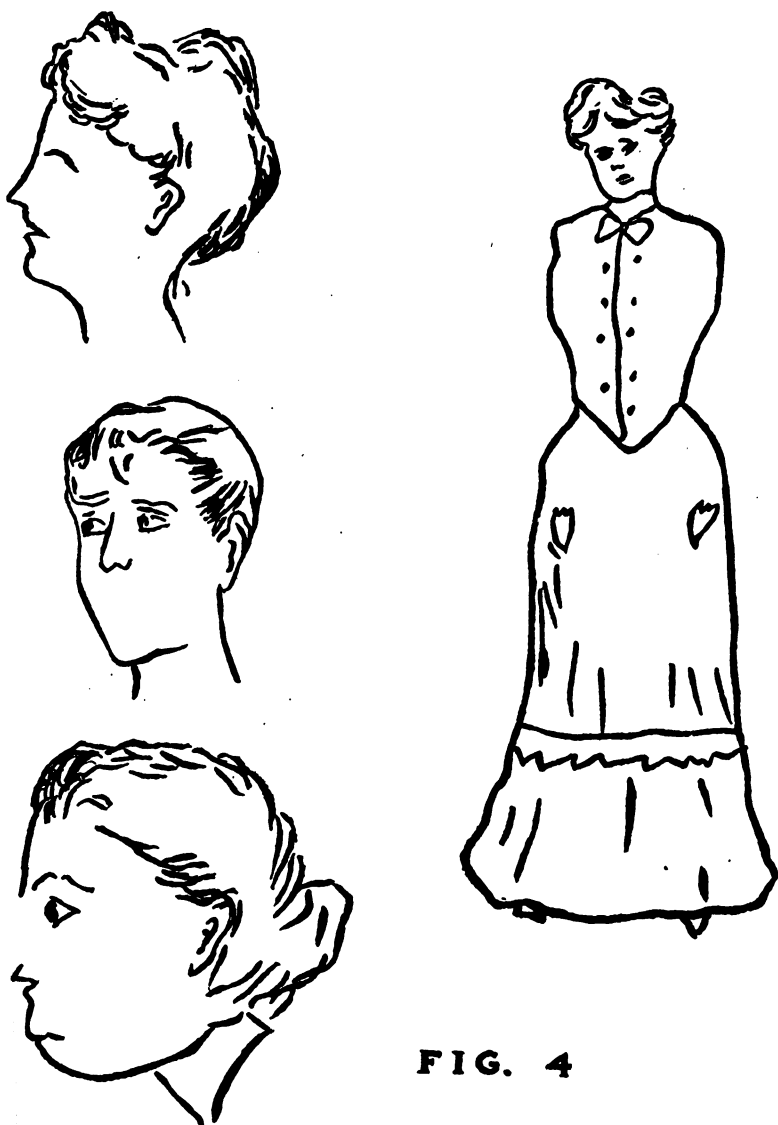


FIG. 4

contact or numeral. The count is alternately too large and too small. If such a child accidentally counts 13, require repetition, in order to eliminate chance. About 94 per cent of normal seven-year-old children should pass this test. (Goddard.) Two-thirds of six-year-old children fail. (Meumann.)

Test 2.—Description of Pictures.

Material. A series of pictures showing persons in familiar situations, preferably the same pictures used in test 4, age III.

Method. The experimenter displays one of the pictures, with the statement: "I have a picture here, and I want you to tell me what you see in it. What is it about?" Insist on complete sentences instead of disconnected words or phrases. Two additional pictures may be displayed in the same way.

Time. The normal child of seven will respond without repeated urging or stimulation. The necessity for continued prodding should lead to the suspicion of lagging interest and attention, or of limited comprehension.

Record: + if the subject tells what is taking place in the pictures, or describes scenes.

Note. At three the child *enumerates objects* in the picture; at seven he *describes actions*; after twelve he *interprets* the picture. Seventy-seven per cent of normal seven-year-old children may be expected to pass this test. (Goddard.)

Test 3.—Discovers Defects in Pictures.

Material. Provide a plate containing four incomplete outline drawings of the human face or form. (Fig. 4.) Preferably these drawings are cut apart, and mounted singly on cards about 4 x 6 inches.

Method. Present the pictures one at a time, with the statement: "Here is a picture. Look at it carefully. Is there anything missing in it that ought to be there?"

Time. A delayed answer, especially if it be preceded by tentative guesses may be symptomatic of slow, imperfect or defective intelligence.

Record: + if the child discovers correctly three out of the four defects.

Note. Some children find the absence of the body from the three profile views of the face more disturbing than the obvious defects of the face. Make sure that the child understands exactly what is wanted. Goddard's figures show that 90 per cent of normal seven-year-old children may be expected to pass the test. Sixty-six per cent of six-year-old children fail.

Test 4.—Copying Diamond-shaped Figure.

Material. A card 4 x 6 inches on which is drawn in black India ink a diamond-shaped parallelogram, about one inch on each side. A sheet of paper, pen and ink.

Method. Display the drawing to the subject. "Here is a figure I want you to copy. See how much like this one you can make your drawing." The child must use pen and ink.

Time. Record the time.

Record: + if the subject succeeds in producing a figure that has a reasonable resemblance to the original. (See fig. 5.) The first three figures in the cut pass. The last three are failures.

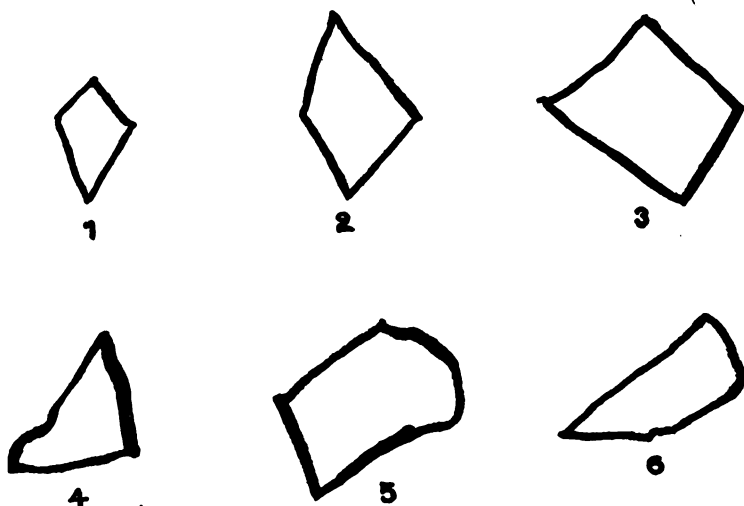


FIG. 5

Note. Failure to succeed may be due to defective apprehension of the original, to defective motor control, to unfamiliarity of pen and ink, or to indolence. It is desirable in case the drawing has been incorrectly finished to locate the fault, if possible, by suitable questions. About 92 per cent of normal seven-year-old children should pass this test.

Test 5.—Recall of Color Names.

Material. Four small pieces of gray cardboard 2 x 5 inches. One piece each of red, yellow, green and blue paper, 1 x 3 inches. The colors must be saturated, but not glossy. Mount one of the colored papers on each of the cardboard pieces.

Method. Place the colored papers before the subject, touch rapidly each of the colors in succession, with the request, "Tell me the names of these colors as I touch them."

Time. Six seconds should ordinarily be adequate for the complete reaction.

Record: + if the subject names all the colors correctly in six seconds.

Note. The test is not a color discrimination test, so much as a word association test. Incidentally it may occasionally serve to reveal color blindness. Ninety-five per cent of seven-year-old children will meet the test successfully. (Goddard.)

AGE VIII.

Test 1.—*Comparison of Subjective Images.*

Material. None required.

Method. The aim of the test is to discover the child's ability to point out like and unlike parts of the memory images it has gained by experience. To this end three pairs of words are used, as follows: "Are cloth and paper the same?" No? Well what is the difference between them?" Use, in turn, two other pairs; *e. g.*, (a) wood and glass; (b) knife and fork; (c) window and door. It may occasionally be necessary to expand the questions above suggested, until the child catches the idea.

Time. Two minutes are allowed.

Record: + if two pairs out of the three are satisfactorily compared within the time limit of two minutes. Otherwise the test is marked a failure.

Note. Many children possess only vague images, lacking in clear-cut detail; others are unable to marshal their images on demand within a reasonable length of time, or in response to ordinary stimuli. Both these types of children will fail to pass the test. Ninety-seven per cent of eight-year-old children should pass the test within the given time limit.

Test 2.—*Reversed Association.*

Material. None required.

Method. The task proposed is to count from 20 to 1, inverting the usual order of counting, and testing the ability of the subject to trace a chain of association in reversed order. "You know how to count up from 1 to 20, do you not? I want to hear you count the other way, down from 20 to 1. This way, 20, 19, and so on. Show me how well you can do it." One trial only is allowed, and there must be no prompting.

Time. Twenty seconds are allowed for the test.

Record: + if the subject succeeds in counting from 20 to 1 within the time limit, with not more than one error or omission or transposition.

Note. Ninety-nine per cent of eight-year-old school children succeed in passing this test.

Test 3.—Days of the Week Named.

Material. None required.

Method. "I want you to give me the names of the days of the week in the order in which they come. Let us hear them." No prompting is allowed, and only one trial may be given. The test may be supplemented by the further question: "What day was yesterday?" "What day will the day after to-morrow be?" The main Binet-Simon test aims to test training and memory. The supplementary questions test association control over memory material.

Time. Ten seconds are allowed for the main test.

Record: + only if all the days are named in the right order within the time limit. The enumeration may begin with any day.

Note. Ninety-five per cent of normal eight-year-old children pass the test. (Goddard.)

Test 4.—Adding After Counting by Ones and Twos.

Material. A card, on which are pasted side by side, and in a straight line, three 1-cent stamps and three 2-cent stamps. (1, 1, 1, 2, 2, 2.)

Method. Display the card to the child, with the statement: "I bought these stamps at the post office. How much did I pay for them?" "Count them, and see." (A few children may not know the value of the individual stamps. The value of each kind of stamp should be explained before giving the test.)

Time. Ten seconds are allowed for the test.

Record. + whenever the subject gives the cost price correctly within the time limit.

Note. The method of counting and adding sometimes throws interesting side-light on the mental processes of the child under examination. Goddard's tables show that 85 per cent of normal children at age eight should pass this test.

Test 5.—Reproduction of Five-place Numbers.

Material. A card about 4 x 6 inches, with three five-place numbers like the three below.

Method. "Here are some numbers that I want you to say after me. I want you to repeat them exactly as I say them. Now listen: (a) 5, 2, 7, 4, 9; or (b) 2, 8, 5, 7, 3; or (c) 9, 4, 7, 2, 5." The numbers must be pronounced *once*, slowly, distinctly, without accent, at the rate of one each one-half second.

Time. The reaction should be immediate. After thirty seconds it will be all but impossible for most children to reproduce the five digits correctly.

Record: + if the subject succeeds in one out of three trials in reproducing the five numerals exactly as they were given, without omission or transposition.

Note. The test is a difficult one for eight-year-old children. Eighty-four per cent succeed in passing it, according to Goddard's table.

AGE IX.

Test 1.—*Making Change.* (25¢—4¢.)

Material. Fifteen pennies, five nickels, and three dimes, arranged without overlapping on the table, conveniently near the subject. In addition the experimenter will need a 25-cent piece.

Method. Invite the child to play store. "You can be the store-keeper. I want four cents' worth of candy. Here is a quarter. Please give me my change." Insist that the subject shall not only tell how much change is due, but shall actually count it out. (*If the honesty of the subject is uncertain, experience has shown that it will be wise to watch the capital.*)

Time. No definite time limit has been agreed upon within which the child must succeed in making the change.

Record: + if the child *both* announces the *amount* of change due and *actually hands over* the correct change.

Note. At nine years of age all children should be able to do this test satisfactorily. Some children, however, have not grasped the meaning of relative monetary values, and betray their deficiency in this test. Make sure, if possible, whether the defect is due to lack of training or to mental defect.

Test 2.—*Definitions Better Than By Use.*

Material. None required.

Method. The subject is to be led to define series of common terms. "What is a spoon?" "How would you define it?" Ask in turn for a definition of bed, knife, house, father, or of fork, chair, table, horse, mama. A classifying definition is needed to pass.

Time. No definite time limit has been agreed upon. Children differ enormously in the speed with which they succeed in evolving definitions for their most commonplace ideas.

Record: + only if subject gives three out of five definitions of a type better than by use: *e. g.*, "A table is a piece of household furniture," etc.

Note. At nine years of age, according to the earlier authorities, all children should pass, though Goddard found that 38 per cent failed. The value of this and similar tests, as giving an in-

sight into the deeper workings of the child mind, can hardly be overestimated. The skilled observer will note not only the definitions themselves, but also the by-product expressions which the subject evolves.

Test 3.—*The Calendar Date.*

Material. None required.

Method. It is required to secure from the subject a complete statement of the calendar date, including the day of the week and month, name of month and the year. Begin with the question, "What is the date to-day?" If necessary, extract information as follows: "What day of the week is to-day?" "What day of the month?" "What is the name of this month?" "What year are we in?"

Time. There is no agreement as to a time standard. Test until the child has shown clearly that he knows or does not know.

Record: + provided the subject has given correctly the information asked for, except that the day of the month may be given incorrectly by as much as three days.

Note. Children of nine years most often fail on the number of the year, a clear indication of the late development of definite time consciousness. (Meumann.) Goddard found that 87 per cent of his children passed at nine years.

Test 4.—*Recall of the Names of the Months.*

Material. None required.

Method. "Please give me the names of the months of the year in their proper order, as fast as you can." The subject may begin at any place he chooses, providing he gives the names in their proper order. No prompting is allowed.

Time. Fifteen seconds is allowed for the test.

Record: + if the child gives the entire list within the time limit with not more than one error, whether of omission or transposition.

Note. Failure to give the required data may be due to lack of training, to poor memory, or to a defective or undeveloped temporal sense. If possible it will be of interest and value to discover which factor is responsible. About 90 per cent of normal nine-year-old school children may be expected to pass this test.

Test 5.—*Arrangement of Weight Series.*

Material. Provide five wooden cubes or tin salve boxes, loaded to weigh respectively 6, 9, 12, 15, and 18 grams. The blocks or boxes must be of the same size and appearance, though the initial of each weight may be written on each block or box, to facilitate use. (The salve boxes may be conveniently of ½-oz. size, and may be loaded with paste white lead.)

Method. Place the five boxes in irregular order before the child, calling attention to their unequal weight. "I want you to arrange these five weights in a row so that the lightest one shall come first, and then the other four in the order of their weight. Lift them this way, with your thumb and first finger. Now, which is the lightest?" "Which is the next?" "And now the next?" etc., until they have been all adjusted. Record the order in which they were placed. Give three trials. Revision is allowed at any point.

Time. Not more than three minutes are allowed for the three trials together.

Record: + if two of the three trials were correct, and if the whole operation was done within the time limit of three minutes.

Note. Eighty per cent should pass the test. When the subject has arranged the weights the last time the question, "Are you sure you are right?" asked in a surprised manner, will serve as a test of suggestibility. The suggestible child will hasten to re-adjust the weights.

AGE X.

Test 1.—Names Common Pieces of Money.

Material. One each of the penny, nickel, dime, quarter, half-dollar, dollar, and one each of the one- two- and five-dollar bills.

Method. Place the pieces on the table near the subject. Arrange them in a row, but not in the order of value. "Point to the pieces of money one by one, and tell me the name of each one as you point to it."

Time. No specified time allowance has been agreed upon, though it is highly desirable that a record of the actual time consumed be kept.

Record: + whenever the subject succeeds in naming correctly all the pieces of money as he points to them.

Note. A recent suggestion has been made to drop the five-dollar bill from the list of pieces required. The child is to be asked to name additional pieces of paper currency up to ten dollars. Ninety-five per cent of normal ten-year-old children may be expected to pass the test.

Test 2.—Drawing Designs from Memory.

Material. A card 4 x 6 inches bearing the designs below (fig. 6) in India ink. A blank sheet of paper, pen and ink.

Method. Place the card before the subject, and allow him to study the designs for ten seconds. Then remove the card. "Now I want you to copy the two designs from memory." Require the child to use pen and ink in making his reproduction.

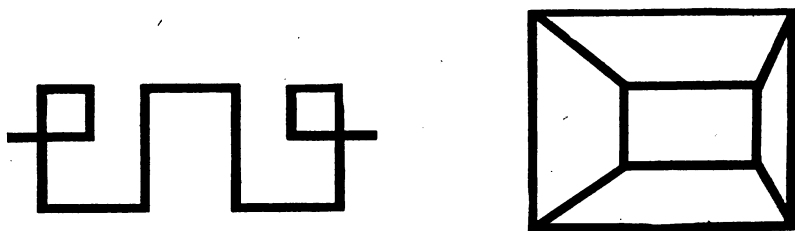


FIG. 6

Time. No final standard of time has yet been arranged for this test. The number and directness of the marks made in reproducing the figures is probably of greater importance than the time required to complete the copy.

Record: + if the copy is a substantial reproduction of the original.

Note. Binet used this test in another connection, and found a high degree of correspondence between it and the intelligence of the child being tested. (Meumann, vol. 2, p. 396.)

Test 3.—Repeats Six-place Numbers.

Material. A card 4 x 6 inches on which are written plainly, in black India ink, three six-place numbers. The digits composing the numbers must be nonconsecutive.

Method. Hold the card so that the subject can not see the numbers. Then instruct as follows: "I am going to read a number, and I want you to repeat it after me just as I read it. Now listen."

First trial: 3, 7, 4, 9, 2, 6. Second trial: 8, 3, 6, 2, 9, 7. Third trial: 2, 7, 8, 4, 9, 5.

Read the number once, clearly, in a distinct voice, without accent, at the rate of one-half second per digit. Give three trials if necessary to secure one successful reproduction.

Time. The reproduction should be immediate. Delay means failure, because with every second the probability of success becomes smaller.

Record: + if the subject succeeds in reproducing with absolute correctness one out of the three trial numbers read to him.

Note. Failures may be due to complete failure of memory; to substitution of wrong numerals or to transposition of the right ones into wrong places. Each type of failure throws interesting side-lights on the mental type.

Test 4.—Comprehension of Concrete Situations.

Material. None required, though the questions below might, for convenience, be written on an index card 4 x 6 inches.

Method. Eight questions representing concrete problems are proposed to the subject for solution. Ask the questions slowly and distinctly. If necessary, the questions may be repeated once.

1. "What ought you to do when you miss a train?"
2. "When a friend accidentally hits you?"
3. "When you break something that belongs to somebody else?"
4. "When you are on the way to school and find that you are going to be late?"
5. "When you are away from home, and it begins to rain?"
6. "When you want to buy something, but have n't the money?"
7. "What should you say when you are asked to give your opinion about somebody you don't know very well?"
8. "Why should we judge a man more by his acts than by his words?"

Write the answers to each of the questions yourself.

Time. Twenty seconds is allowed for each reply.

Record: + if five out of the eight questions are answered in a definite, intelligent manner. Vague, far-fetched, forced answers count as failures.

Note. The eight questions here given are selected from a considerable number of problems that have been proposed by various authors. They seemed the most practical and natural questions in the groups examined by the writer. The answering in an intelligent way of these questions indicates ability to grasp a concrete situation, and to meet it in a practical way—one of the most searching tests of mental ability. Goddard records 92 per cent successes out of 106 normal ten-year-old school children who tried this test.

Test 5.—*Invents Two Sentences with Three Given Words.*

Material. None required.

Method. "I am going to give you three words, and I want you to make two sentences with them. Like this: 'nail, hammer, garden.' 'He drove the large nails with his new hammer.' 'Then he took the hammer out into the garden to play.' You see I used 'nail and hammer' in my first sentence, and 'hammer and garden' in my second one. Do you understand what I want you to do?" Continue the explanation, if necessary, until the child appears to understand what is wanted of him. Then give the following three words: ball, boys, river. Keep a written record of the sentences produced.

Time. One minute is allowed for the reaction. Note the exact time required for the test.

Record: + whenever the subject constructs within the one-minute time limit two complete intelligent sentences with or without a conjunction.

Note. The character of the sentences produced is of diagnostic importance. Bald, matter-of-fact sentences of an indefinite character, *e. g.*, "Boys play ball," indicate a simple, immature, low-grade intelligence; while definite, precise, circumstantial sen-

tences, *e. g.*, "The boys that live across the street play ball every afternoon," indicate greater spontaneity and mental fertility. Most serious of all is the situation in which no intelligible sentences at all are produced.

AGE XI.

Test 1.—*Detection of Absurdity.*

Material. None required.

Method. "I am going to give you some sentences that have nonsense in them. Listen carefully and tell me if you can tell me where the nonsense is. Now listen:

"(a) I asked a boy how many brothers he had, and he told me: 'I have three of them, Tom, Ed and myself.'

"(b) Two band boys were down on the corner, blowing a drum and beating a horn with all their might.

"(c) Yesterday there was a slight blaze down town, but it was n't serious; only half the city was burned. '

"(d) A man asked a boy where Mr. Smith lived. He said: 'The first house you come to is a barn, and the next is a haystack. The next is Mr. Smith's.'

"(e) A man came to see me, but I was not at home. My friend asked him to leave his name. The man said: 'Oh, it is n't necessary to leave my name. He knows me.'

"(f) Last Friday two of my friends called on me. In the evening all four of us went to the theater."

Select five of the sentences for the test. Pronounce them slowly and distinctly.

Time. Two minutes are allowed for the entire test.

Record: + if the child discovers the absurdity in three out of five of the statements within the time limit. Otherwise record failure.

Note. It has seemed wise to the writer to substitute in place of the sentences usually employed, others of a less gruesome type. The test touches upon the essential essence of the associative functions, and for that reason it is to be advised that the time for each of the five reactions be taken singly, and that a complete record of the details of the entire test be made. Goddard, using the gruesome sentences which Binet-Simon proposed, found 92 per cent of successes. The test as here suggested shows about the same ratio.

Test 2.—*Constructs One Sentence with Three Given Words.*

Method. Follow the same method as in test 5, age X, except that instead of calling for the construction of two sentences out of three words we now call for one sentence containing the three words. Explain carefully what is wanted. Then, after giving the warning signal, give the words, money, tree, country, or paper, boy, street.

Time. One minute is allowed for the satisfactory completion of the sentence.

Record: + if the subject makes a simple or complex sentence containing the three given words. Two coördinate clauses connected by a conjunction is a failure. We want one single major idea with or without a modifying clause. The sentence must make sense, and be free from absurdity.

Note. Observe carefully the quality of the sentence produced. The suggestion made in connection with test 5, age X, holds in connection with this test as well. The Vineland tables show that but 73 per cent of normal eleven-year-old school children passed the test.

Test 3.—*Gives Sixty Words in Three Minutes.*

Material. None required.

Method. "I want to see how many different words you can think of and say in three minutes. Any kind of words, big or little, just as you think of them. One boy gave over 200 words in the three minutes. See how many you can give." If necessary, illustrate by giving him an illustrative series: dog, cat, fish, river, man, boots, etc. Should the child stop either through indolence, confusion, inhibition or for other reasons before the time allowed is up, urge him to continue: "Go ahead! You can do better than that!" etc. Make a verbatim record of the words given.

Time. Three minutes are assigned for the test.

Record: + if the child succeeds in producing *at least sixty different words*, exclusive of repetitions, within the time limit. Nonsense words do not count.

Note. It will be interesting to note whether the child gives its words in a regular, well-controlled stream or whether the words are produced in hurried, congested groups, broken by prolonged pauses—a neurotic earmark—and whether the words move in a straight line or in circles, repeating with variations a single central thought. Neologisms should also be noted, as well as the motor by-products accompanying the test. Note further the child's attitude toward the test, and the scope of ideas it brings to the surface. Ninety-two per cent of Goddard's normal children succeeded.

Test 4.—*Finding Rhymes.*

Material. None required.

Method. "Do you know what a rhyme is? Well, whenever two words have the same rhythm and end sound they are said to rhyme. For instance, take cap, lap, map, nap, rap, sap, tap. You see they all have the same rhythm and they end in the same sound. Now I am going to give you a word and I want you to

give me, just as fast as you can, three words that rhyme with it. Ready?" Use either *obey*, or *spring*, or *mill*. Be sure that subject understands just what is wanted of him before beginning the test.

Time. Three rhymes in one minute is standard.

Record: + if three rhymes meeting the specifications are furnished within the time limit.

Note. The test involves not only verbal facility of the child, but also its synthetic associative processes, its sense of rhythm, and its auditory motor efficiency. Ninety per cent of normal children may be expected to succeed in the test.

Test 5.—*Reconstruction of Dissected Sentences.*

Material. Three cards 4 x 6 inches, each having plainly written or printed on its face a dissected sentence, like those below. The ones herewith given are standard as to length and difficulty.

Method. "I have here the pieces of some sentences which have fallen apart. They are all mixed up, and I want you to put them together again for me as they should be to make correct sense. Here is the first one." Place the card bearing the first sentence before the child. Then in like manner display the other two cards. The child answers orally. Record the replies. The sentences are:

(a) Hour—for—we—early—at—park—an—started—the.

(b) To—asked—paper—my—have—teacher—correct—the—I.

(c) A—defends—dog—good—his—bravely—master.

Time. One minute is allowed for each of the sentences, correctly reconstructed.

Record: + if the child reconstructs at least two out of the three sentences within the time limit allowed per sentence.

Note. The test is a difficult one, involving, as it does, a drastic appeal to the synthetic functions of the child's mind. Observe carefully how the child works. Goddard found that only 80 per cent of his normal eleven-year-old children succeeded.

AGE XII.

Test 1.—*Reproduction of Seven-place Numbers.*

Material. Provide a card 4 x 6 inches in size, and upon it write plainly three seven-place numbers, taking care that the digits are not serially related.

Method. "I have some numbers which I want you to repeat after me, just as I say them, without any change whatsoever. Now listen carefully! Ready?" First trial.—2, 7, 9, 3, 8, 5, 1. Second trial.—3, 9, 1, 6, 2, 7, 4. Third trial.—5, 3, 7, 6, 9, 4, 8. The numerals must be pronounced *once*, clearly, distinctly, with no marked accent, at the rate of one each half second.

Time. The reaction should be given at once. Delay renders success improbable, as the memory after-image is fleeting at best.

Record: + if one of three trials is absolutely successful.

Note. Errors by omission, absolute failure of recall, transposition, and substitution of wrong digits should be noted. They are characteristic of special mental types. Eighty-four per cent of ordinary eleven-year-old school children should succeed in passing the test.

Test 2.—*Definitions of Abstract Terms.*

Material. None required.

Method. "I want you to tell me the meaning of two or three words that I know you sometimes use. Tell me in your own words just what you mean by them when you use them." First: **charity**. Second: **justice**. Third: **goodness**. Record the replies verbatim.

Time. Allow the child all the time he needs, as long as he is evidently searching for a solution.

Record. Two definitions which contain the essential idea, regardless of the crudity of language, pass the test.

Note. The ability to generalize is one of the latest to develop, and one of the most frequently affected by the factors resulting in arrest. The test is a good one, in spite of the difficulties met in interpreting the results. Observe especially whether the child's difficulties are due to lack of words, or to muddy and undeveloped appreciation of the ideas contained in the words.

Test 3.—*Repetition of a 26-Syllable Sentence.*

Material. None required.

Method. "I am going to pronounce a sentence which I want you to repeat just as nearly as you can like I give it to you. Ready?" First trial: "Yesterday I passed on the road a huge yellow dog with a big basket of meat and sausage in his mouth." Pronounce the sentence *once*, clearly, slowly and distinctly. If the subject does not repeat the first sentence correctly give him another, and then a third. Three trials are permitted. No prompting is permitted. Second trial: "Uncle John brought me a fine collection of arrows when he came back from his trip through South America." Third trial: "Harry had a fine new rifle which his grandfather bought for him in New York on his birthday last summer."

Time. The reproduction should be immediate.

Record: + if one out of the three sentences is reproduced with verbatim accuracy.

Note. This test of logical memory is distinctly different from test 1, age XII. It brings clearly into the foreground the sub-

ject's ability to carry an idea unchanged either as to size, form, or content. Note, therefore, clearly what kind of errors the subject commits, as the test has undoubted diagnostic value. It's very difficulty makes it valuable. Goddard reports only 42 per cent of his twelve-year-old children as succeeding in the test.

Test 4.—*Resists Suggestion.*

Material. Provide six blank index cards 6 x 8 inches. On the first of these cards draw two lines, A and B. Line B is to be drawn as a continuation of A, and the interval between the two lines should be one-half inch. Let line A be at the left and two inches long, while line B is at the right and two and one-half inches long. On the second card also draw two lines in the same manner, except that the line at the left is two and one-half inches, and that at the right is three inches in length. On the third card are to be drawn two lines also, again in the same manner, save that now the line at the left is three inches in length, and that at the right is three and one-half inches. On each of the fourth, fifth and sixth cards draw two lines, also in the same manner, except that all the lines now are to be three and one-half inches long; i. e., each card has two lines three and one-half inches long, drawn one-half inch apart, and as a continuation of each other. Use India ink and a drawing pen. The lines should be heavy and clean-cut. Number the cards unostentatiously in the upper right-hand corner from 1 to 6, in the order as here described.

Method. Lay card number one on the table before the subject with the question: "Which of these two lines is the longer?" When the subject has answered, presumably correctly, present the second card so as to cover the first, and again ask: "And which of these lines is the longer?" Repeat the procedure with the third card, using the same question. Now present card number four, changing the question to "And of these?" Take care to give no clue, either by gesture, tone or attitude, as to the right answer. Finish the test now by presenting in order cards 5 and 6, using the same question as with card 4, and using the same caution as to unconscious clues. Practice asking the questions in a monotone, free from rhetorical accent. The nonsuggestible child will declare the lines on cards 4 to 6 equal. The suggestible child, having three times found the right-hand line longer than the left, will tend unconsciously to the presumption that the same relationship holds on the remaining cards and will answer accordingly. He will declare the left-hand lines to be longer than the right-hand ones.

Time. Try to provoke quick responses, as prolonged study diminishes the tendency to yield to suggestion by this device. Simpler and better tests for suggestibility would not be difficult to devise. For the sake of standardization, however, it is perhaps best to use the one given.

Record: + if the subject has twice judged correctly as to the length of the lines on cards 4 to 6, inclusive; otherwise failure.

Note. The factor of suggestibility in a twelve-year-old child has a profound bearing on its integrity of will, thought and memory. The over-suggestible child is weak and unstable and becomes easily the prey of those who prey on the weak. Moral irresponsibility usually spells "suggestibility." The test is highly important, and should be worked out carefully, possibly in another form. Binet found that out of thirteen ten-year-old children only five succeeded in passing the test.

Test 5.—Problem of Implied Facts.

Material. None required.

Method. It is desired to test the child's ability to draw inferences. We use two incomplete statements, which he is to fill out. Proceed as follows: (a) "A man walking in the forest all of a sudden began to run at the top of his speed, until he came to a tall tree. He climbed up into it as fast as he could, and slid out on one of the branches, just as far as he dared. What was the matter?" (Answer: A bear or wild animal was after him.) (b) "My neighbor has been having strange visitors. First a doctor came to his house, next a lawyer, and just now a minister went in. What do you think has happened?" (Answer: Your neighbor was sick or dying.)

Time. No standardized time limit has been devised for this test, though it is certainly desirable.

Record: + when both questions are answered with rational inferences.

Note. Ninety-three per cent of normal twelve-year-old children passed the test under Goddard. It should be noted, however, that he used another question instead of the first one above. Its gruesome, not to say offensive character, however, has led most American writers to reject it, and suggest a substitute.

AGE XV.

Test 1.—Interpretation of Pictures.

Material. Provide pictures either identical with or similar to those used for test 4, age III, and test 2, age VII.

Method. Place three pictures in succession before the subject, and require him to describe or interpret them. The purpose of the test is to elicit from the subject a statement of the meaning or motive of the individual pictures. Usually the response is in the form of some word expressive of a feeling or emotion.

Time. No time standard has yet been accepted for the test, though the test lends itself well to such standardization.

Record: + if the subject succeeds in interpreting the motive in terms of a phrase or word. All three pictures submitted must be interpreted.

Note. The test has commended itself to practically all serious students of the problem of intelligence scales. It essays to test primarily the processes of emotional evaluation which come to maturity with the dawn of adolescence.

Test 2.—Reversed Clock Hands Visualized.

Material. None required.

Method. "I want you to imagine that you see the face of a clock, and that it is 2:56 in the afternoon. Can you imagine that you see the hands" "Where is the long hand?" "And where is the short one?" "Now imagine that the two hands are reversed, that the long hand and the short hand have exchanged places: What time would it be?" (Answer: 11:15.) Try 6:20 in the same way. (Answer: The hands never normally take that position.)


Time. No standardized time has been agreed upon for this test though the test would lend itself very appropriately to time standardization.

Record: + whenever the subject succeeds in giving the answers above indicated, without prompting.

Note. The test is a difficult one and will in all likelihood need simplification or restatement. It involves especially the visualizing function, and may, for that reason be expected to appeal particularly to eye-minded children. Poor visualizers will be unlikely to succeed.

Test 3.—The Diagram Cipher.

Material. None required.

Method. Construct the diagrams below in the presence of the subject, and while he is giving close attention. Call attention to the vertical arrangement of the letters in the first and second diagrams, to the counter-clockwise arrangement in the third and fourth, and to the letters, A, J, S and W as the first letters of each of the diagrams respectively. Emphasize also the presence of the dots in the corners of the second and fourth diagrams. When once the scheme has been made clear, suggest that in the Civil War the soldiers of the South used this diagram for secret correspondence, by writing for each letter of their message that part of the diagram in which the letter is placed in the key. For illustration the word "wasp" would be written . Now ask the subject to write his own name in the cipher, allowing him to use the key. Then, having by this means made it perfectly clear that the child understands the principle of the cipher, remove the key, and ask him to write "Caught a spy" in this code. After the test proper (Caught a spy) begins, the sub-

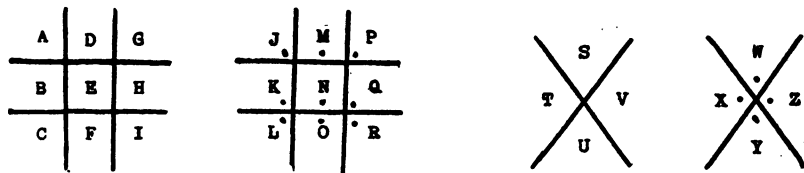


Fig.

ject may not see the key, nor may he make a new one for himself. He must rely entirely on his memory for the key.

Time. Healy and Fernald, from whom Goddard adopted this test, suggest no time standard, either for the test as a whole, or for the individual letters.

Record: + when the subject succeeds in translating the sentence into the code with not more than one error. Every wrong or incomplete symbol counts as an error.

Note. Children find the test very interesting, and it throws interesting side-lights on the child's ability to visualize, to disassociate, to remember, to attend persistently, and to establish new associations. As a learning test it offers much promise, especially if the time be rigorously controlled. The author has found no twelve-year-olds able to do the test within a reasonable time.

Test 4.—*Logical Association.*

Material. A card, 4 x 6 inches, on which the following words are written: 1, good; 2, outside; 3, quick; 4, tall; 5, big; 6, loud; 7, white; 8, light; 9, happy; 10, false; 11, like; 12, rich; 13, sick; 14, glad; 15, thin; 16, empty; 17, war; 18, many; 19, above; 20, friend.

Method. "If a dog is not alive, what is he? Dead, of course. Well, the word 'dead' is the opposite of the word 'alive.' Now what is the opposite of 'good'?" Then present in order the rest of the list. If necessary illustrate again, but do not continue the illustrations beyond the second word. The subject's failure to understand the directions is sufficient evidence that he will be unable to pass the test. Keep a verbatim record of the subject's replies, or better yet, have him write his own opposites.

Time. No standard of time has been established. In general, the individual reactions should be given in three seconds. It would be wise to note the time of each reaction with a stop watch.

Record: + if appropriate reactions are given for at least 17 out of the 20 words in the list. It may be difficult in all cases to say absolutely whether a given reaction is entirely right or wrong. In such cases, if the word may be conceivably correct in certain limited situations, credit as one-half right, and add it into the record accordingly, *i. e.*, 12 words entirely right, and 8 half right = $12 + \frac{8}{2} = 16$, which would mean that the record is a failure, since 17 are required to pass.

Note. The test indisputably has merit. Observe how the subject meets the situation, more especially when confronted with the more unusual problems, such as the words "war" and "friend." Some children are entirely silenced, while others, in default of the appropriate term offer either a more or less inappropriate one, or propose simple negative terms such as "un-war," "unfriend," etc.

Test 5.—Ethical Generalization (Terman).

Material. A card 4 x 6 inches, upon which has been written the fable below.

Method. "I have a story I want to read to you. I want you to listen carefully, because when I am through I want you to tell me what you think of it."

First Fable, "The Milkmaid and Her Plans."—A milkmaid was carrying her pail of milk on her head, and mused thus: "The money for this milk will buy 300 eggs. The eggs will produce at least 250 chickens. With the money which the chickens will bring I will buy a new gown. In this new dress I will go to the parties with the young fellows, who will all propose to me. But I will toss my head, and refuse them, every one." At this moment she tossed her head in unison with her thoughts, and dashed the pail of milk to the ground, and all her imaginary dreams perished in a moment.

"Now tell me what do you think of the story; what is it driving at?" Having secured a reply to the first fable, read the second also.

Terman found that 54 per cent of his fourteen-year-old children passed this fable.

Second Fable, "The Fox and the Crow."—A crow, having stolen a bit of meat, perched in a tree, and held it in her beak. A fox, seeing her, wished to secure the meat, and thus addressed her: "How handsome you are! And I have heard that the beauty of your voice is equal to that of your form and feathers. Will you not sing for me, that I may judge if this be true?" The crow was so pleased that she opened her mouth to sing and dropped the meat, which the fox immediately ate.

Thirty-nine per cent of Terman's fourteen-year-old children passed this fable.

Time. No definite time limit for the response need be set.

Record: + if the subject gives an entirely correct statement of the point of one of the fables in a generalized form, *e. g.*, if the response is in the form of a bald, concrete moral, the test is to be graded as a failure, since the purpose of the test is to bring to the surface the subject's ability to generalize moral and social relationships.

Note. Terman and Childs, and also Meumann, assert that the test is especially valuable as indicating the ability of the subject to discern the motives of actions, to catch the underlying idea of an action, and to reveal the child's social consciousness. They contend that it may be possible with this test to discover moral abnormalities in children who otherwise appear entirely normal. (Neumann, vol. 2, pp. 216-218.)

ADULT AGE.

Test 1.—*Interpreting Cut in Twice-folded Paper.*

Material. A number of sheets of paper about six inches square, pair of scissors.

Method. In the presence of the subject take up one of the sheets of paper. "I am going to ask you to watch me carefully. First I fold this paper once across the middle, into halves. Then I fold it again across the middle into quarters. This way. Now I am going to cut an equilateral triangle from this corner where the folds are. Now, how would this paper look if I were to open it. I want you to draw for me on this sheet of paper a diagram of what you think this cut sheet would look like if it were opened up like this one. (Demonstrate by opening a similarly folded, but uncut sheet.) Do not show the triangle you have cut out. No coaching allowed. If there is any likelihood that those who have already taken the test have talked to your subject about it, vary the test by cutting out an irregular section, or even by cutting out two simple sections.

Time. No time limit has been adopted for this test.

Record: + if the subject draws an approximately correct diagram of the result of the cutting. The drawing may deviate in the matter of proportions, but the essential idea must be contained in it.

Note. The test is undoubtedly difficult, and involves to a large degree the function of visualization, and the ability to place visualized images in definite relationships purely by psychic effort. It is always well to make sure that the subject has not done the test before, nor seen it done by others.

Test 2.—*Abstract Terms Compared.*

Material. For convenience write on a card 4 x 6 inches the following pairs of abstract terms: Pleasure and honor; evolution and revolution; event and advent; poverty and misery; pride and pretension.

Method. Request the subject to point out the essential differences between each of the couplets above indicated. The writer requires his subjects to write their replies. The best type of reply involves a definition of each of the terms, and an emphasis of the essential differences so revealed.

Time. No definite time limit has been set, though it would be valuable to note the time required to solve each couplet. Many of the tests in the series involve the two factors of speed and accuracy. While these are sometimes inversely related, this is by no means always the case, and a brilliantly satisfactory solution worked out in a minimum time is certainly indicative of a more efficient type of intelligence than the same solution worked out laboriously and at the cost of many minutes of time.

Record: + when the essential differences between the members of any four couplets are indicated.

Test 3.—*Reproduction of Logical Content.*

Material. None required.

Method. Explain to the subject that you are about to read a selection to him and that you will ask him to tell you the substance of what you have read. Urge him to give you close attention. Read to him, *once*, slowly, distinctly, and with expression the following selection. "One hears very different judgments on the value of life. Some say it is good, others say it is bad. It would be more correct to say that it is mediocre; because on the one hand it brings us less happiness than we want, while on the other hand the misfortunes which it brings are less serious than they might be. It is the mediocrity of life that makes it endurable, or still more, that keeps it from being positively unjust."

Time. The reproduction should be given at once.

Record: + if the subject succeeds in giving the central thought in his own words.

Note. The test as here given is taken with minor verbal modifications from Goddard. Note that the emphasis here is placed on the recall of logical rather than direct sensory material.

Test 4.—*Concrete Ingenuity.*

Material. None required.

Method. "I have a problem which I want you to solve. A farmer was on his way to market. He had with him a bushel of corn, a fox and a goose. He came to a river which it was necessary to cross. There was no bridge and the only boat available was so small that he could take only one of his commodities across at once. Now if he left goose and fox together, the fox would eat the goose. If he left the goose and the corn together, the goose would consume the corn. How did he contrive to get his property across without having the fox eat the goose, or the goose eat the corn?" Read the problem in a clear, distinct tone of voice. If necessary repeat the problem in whole or in part. Give no advice. If possible, write or have the subject write his solution.

Time. Record the amount of time consumed in working out the solution.

Record: + if the subject succeeds in working out a plan by which the three loads may be safely carried across, *e. g.* (1) Take the goose over; (2) Return empty; (3) Carry the corn over; (4) Return with the goose; (5) Carry the fox over; (6) Return empty; (7) Carry the goose across.

Note. The test, while in the nature of a puzzle, approximates the conditions of a concrete life situation, *i. e.*, given familiarity with all the factors, to manipulate them in such a way as to

produce novel and worthwhile results. The writer proposes this test in place of the "reversed triangle" test, as being more practical, as touching on a phase of function not touched on by any other one of the adult tests, and as being essentially a duplicate of Goddard's test for adult age.

Test 5.—Suggestion of Error.

Material. On a card 4 x 6 inches or on a sheet of paper write in a plain, bold hand the following sentence: "The constituton is our safeguard against oppression." (Note the misspelling of the word "constituton." Be sure to copy it as here given, *i. e.*, incorrectly.)

Method. Place the card before the subject, and request him to "read it carefully, so as to be able to reproduce it." Allow thirty seconds for inspection. Now remove the card, and after one minute request the subject to write the sentence for you on a sheet of paper. "Be sure to write it *just as you saw it, mistakes and all*. You remember, of course, that there were three misspelled words in the sentence as you saw it. Please be sure to put them in, because it is a part of the test of the accuracy of your memory. If you can not remember just what any of the errors were, but do remember in what word they were, mark the word with a cross. That will help some. If you remember seeing some of the misspelled words, but can not recall which they were state how many you remember seeing." Give no hint by look, attitude or tone of the real situation, otherwise the test will fail. Train yourself to give the suggestion in all seriousness.

Time. The subject inspects the sentence thirty seconds. The experimenter fills one minute with general directions. The subject then proceeds at once to write.

Record: + if the subject copies the sentence correctly as it actually was, or does not cross more than one word as probably containing an error.

Note. The test as here given is adapted from Meumann's version of a similar experiment performed by Dueck upon students from 16 to 20 years of age. The writer's attempts with the test as described above have resulted as follows: 12 per cent of 54 students 18 to 24 years old entirely susceptible; 26 per cent of 54 students 18 to 24 years old one-half suggestible; 62 per cent suggestible to a varying but indifferent degree. (Meumann, vol. 2, p. 80.)

CHAPTER V.

The Interpretation of the Results.

Mental tests may be arranged to give insight into either the maturity or the native endowment of those who are examined.

By maturity we mean the development of native capacity as a whole by growth, training and environment. The term is a general one.

By native endowment we mean the special capacities for function with which nature has provided the individual. The term is usually used with specific reference to individual aspects of mental functioning.

The Binet-Simon scale is primarily a system of tests for establishing the *degree of maturity of intelligence*. *It does not pretend to be a complete system of mental tests*, because it does not test individual intelligence-functions, as such, *nor does it concern itself* directly with either the *emotional* or the *volitional* aspect of the individual character.

However, although the scale in question is primarily intended as a measure of intelligence maturity, yet it may be so used as to give valuable insight into the specific endowments of the individual child.

The question of interpretation will therefore be discussed from each of these two angles.

I. THE SCALE AS A MEASURE OF MATURITY.

The thought of the authors of the scale was that the intellectual ability of children of a given age tended to approach a relatively well-marked norm. The individual tests for each age were selected on this basis.

It follows, therefore, that a child may be ranked intellectually on the basis of the age-tests which it passes, regardless of its physiological, anatomical or chronological age. A child may be ten calendar years old, and only six mental years old; *i. e.*, it may have only the mental development of a six-year-old child, in spite of its ten years of growth and experience. Of course the opposite may also be true; that is, the child's mental growth may have outstripped its physical development.

Rule.—To determine the mental age of a child from the results of the Binet-Simon testing proceed as follows: (a) Take

as age standard the tree for which the child passed all the tests. (b) Add to this one additional year for every five higher tests which the child passed.

For example. John Smith, ten years of age, passed all the tests in Age VIII, he passed four tests in Age IX, passed two tests in Age X, one test in Age XI, and one in Age XII. The basic age, that in which he passed all the tests, is eight years. He passed in addition 8 higher tests: $8 \div 5 = 1.6$. Eight years plus 1.6 years = 9.6. John Smith possesses the mental maturity of a normal child 9.6 years of age, *i. e.*, he is approximately normal.

This method of evaluating the results of the scale has been adopted by practically all workers in the field. It is at once the simplest, and, considering the general nature of the tests composing the scale, the most adequate. Stern, of Breslau, suggests dividing the number of tests that John Smith actually passed by the number that he ought to have passed, and using the quotient as a coefficient of mental age; *e. g.*, John Smith should have passed five tests for every year of his age. He actually passed 48. Therefore $48 \div 50 = .96$ is his mental age coefficient. The method has met with indifferent success, and is not in wide use, in spite of certain advantages. Terman and Childs suggest a still different method of working up the tests. The reader is referred to their work for a detailed statement of their plan. (See the bibliography at the end of this pamphlet.)

II. THE SCALE AS A MEASURE OF THE SPECIFIC ELEMENTS OF MENTAL FUNCTIONING.

Although, as already indicated, the Binet-Simon scale does not pretend to be anything more than a measure of mental development, yet a little reflection will show at once that its component tests may, if rightly interpreted, give valuable insight into the detailed aspects of mental functioning. Meumann has clearly pointed out that we have these three distinct types of tests: capacity or endowment, maturity or development, and environment or training.

With this analysis of the scale in mind, it becomes fairly possible to answer not only the question, Is the child subnormal, normal, or precocious? but also, if extra-normal in his development, it becomes feasible to show whether the defect is due to training, or to natural endowment, or to atypical development.

As a general principle, it may be stated that all those tests

which involve the repetition of conventional lists of facts will display the *quality of training*.

Those tests which involve the repetition of auditory digits or sentences, as well as those which involve the various aspects of the associative function, of image building, and of suggestibility, display at least inferentially the *native capacity* for specialized functions.

Those tests which are arranged in progressive steps of increasing difficulty, or which involve the more tardily appearing functions, such as generalization, spatial visualization, reasoning, complex comparison and the like, refer directly to the *maturity* of native capacities.

No sweeping rules can be laid down here. The experimenter is urged to make full notes of each test as it is given. If possible dictate observations to an assistant who is free to write, and then, after the testing is done, read over carefully these verbatim notes. They will reveal on even superficial study a wealth of facts concerning the details of the mental life of the subject which will go far to answer the question "Why, and in what particulars is this child deficient?"

III.—THE CLASSIFICATION OF DEFECTIVE CHILDREN.

By common consent of the workers in the field of mental deficiency—

The child who lags three years behind his chronological age is classed as backward.

The child which shows a mental age of from 0 to 2 years is classed as an idiot.

The child with a mentality of from 3 to 7 is classed as an imbecile.

The child with a mental age of from 7 to 12 years ranks as a moron—a term substituted for the earlier word "feeble-minded."

It should be remembered, however, that in the immature child this classification according to mental age holds only for the time being. Further development is always possible until the age of final crystallization has been reached.

CHAPTER VI.

Appendix A.

A SIMPLE METHOD OF EYE TESTING.

The test described below is intended to reveal the grosser and more serious deviations from the refractive norm. It does not pretend to any degree of absolute accuracy, and it is given here only to enable the examiner to establish the fact that visual defect exists, and of what sort it is. The defects so discovered should in every case be referred to a specialist for further examination and relief.

There are in general five kinds of visual defect:

1. *Amblyopia*—a dimness of vision due to deficiency of the nervous mechanism involved in seeing. It may be congenital and incurable, or a mere by-product of neurotic dissociation.

2. *Asthenopia*—a weakness of the retinal and other visual mechanisms, due to strain or disease. Usually relieved by suitable hygienic measures.

3. *Color-blindness*—either of red-green, or blue-yellow, or of a mixed type. The defect occurs in about 4 per cent of males, and in less than 0.5 per cent of females. It is usually congenital and incurable. For a detailed discussion of the theory of, and tests for, this interesting deviation see Whipple, *Manual of Mental and Physical Measurements*, 2d ed., vol. 1, pp. 181-193.

4. *Ametropia*—a failure of the refractive mechanism of the eye to bring the light rays to a sharp focus on the retina. In the children to be tested the focal point may lie in front of the retina: eye-ball too long—myopia, or nearsightedness; or it may lie behind the retina: eye-ball too short—hyperopia, or farsightedness; or the cornea may present irregular convexity, thus producing two different focal planes within the eye—astigmatism. All three types of refractive error need lenses. *They should in every case be prescribed by a registered optometrist.*

5. *Motor Assymetry*—a defective coördination of the six muscles controlling each eye, with the result that the two eyes do not properly point in the same direction at once. This defect may be latent—heterophoria, or it may be evident—heterotropia, strabismus, or cross-eyes. Mild forms of heterophoria are very

common, but may be neglected. Serious cases of heterophoria, and all cases of heterotropia should be given medical attention as early as possible. (For a full discussion of terminology and tests for heterophoria, see Whipple, op. cit., pp. 175-181.)

The test herewith described concerns itself only with the three major forms of ametropia.

Material Required. Provide an eye-test chart, such as may be secured from any manufacturing optician for about ten cents. The Merry Optical Co., of Kansas City, Mo., furnish a very convenient folding chart in four sections. Provide also a black pasteboard card about 3 x 4 inches square.

Method. Fasten the chart to a wall in such a position that it shall be well-lighted, though not in direct sunshine. The bottom of the chart should be about thirty inches from the floor. Measure off twenty feet in a line perpendicular to the chart, and at this distance place a chair for the subject to be examined. When the subject has been seated, let him hold the black pasteboard card in front of his left eye, while he reads aloud as many of the lines of letters on the card as he is able to distinguish. Let him begin the reading with the largest letters, and when he reaches a line beyond which he is unable to go because of the visual limitations of the right eye, note the number under the last line read. Now proceed in the same manner with the left eye, covering the right eye with the cardboard and reading with the left. Again note the number under the last line read.

At the top of the chart will be found a number of heavy black lines radiating from a common center. Cover each eye in turn, and ask the subject to tell whether any of the lines seem blacker than the rest. Note which, if any, seem darker, and whether the lines are seen as unequally black with one or both eyes.

Record. Normally at a distance of twenty feet the subject should be able to read the line marked "20 feet." Visual acuity may therefore be scored as a fraction whose numerator is 20, the distance the subject is from the chart, and whose denominator is the number under the last line read. If the subject at 20 feet reads only to the line marked "40 feet" with his right eye, then Vis. R. E. = 20/40; that is, the right eye is *myopic*, or *short-sighted*. If with the left eye he reads to the line marked "15 feet," then Vis. L. E. = 20/15; that is, the left eye is *hyperopic*, or *farsighted*. *Whenever the value of the fraction is less than 1 myopia is indicated; when the value of the fraction is greater*

than 1 hyperopia is probably present. If either of the eyes reported any of the divergent lines as blacker than the rest, that eye is astigmatic, and the direction of the lines seen grayer than the rest indicates the axis of the corneal irregularity. Astigmatism is exceedingly common, and few cases of either myopia or hyperopia occur which are not complicated with it.

Even slight degrees of ametropia, especially those complicated with astigmatism, are likely to lead to serious nervous and physical consequences. The afflicted child should always be urged to seek competent counsel and treatment.

Appendix B.

A SIMPLE AUDITORY TEST.

The test herewith suggested has been widely used, and is described in detail by both Whipple and Pyle. It is only intended to test roughly the degree of lessened auditory acuity that may exist. It does not test pitch discrimination, nor does it lend itself, at least in the form usually advised, to accurate diagnostic work. For a detailed statement of other and more accurate tests consult Whipple: *Manual of Ment. and Phys. Tests*, 2d ed., vol. 1, pp. 200 to 222; and also Pyle: *The Examination of School Children*, N. Y., Macmillan, 1913, pp. 55 to 58.

Material Required. An ordinary watch, preferably the one which the experimenter habitually carries; a tape measure five yards in length or more, and some thumb tacks.

Method. Remove the subject's watch, if he carries one. Fasten the tapeline to a wall with the thumb tacks. At the zero end of the tape line place a chair for the subject. Request the subject to seat himself, to close his eyes, and to listen for the ticking of the watch. The ear to be tested first must be just in front of the zero end of the tape.

Hold the watch in the hollow of your hand in such a manner that the palm may serve as a reflector for the sound. Beginning at a point near the ear that is being tested, where the subject hears the ticking distinctly, slowly withdraw the watch along the plane of the tape to a point where the ticking is no longer heard. Do not ask the subject to listen continuously, but with each new position of the watch ask him to declare whether he hears or not. Note the distance at which the watch becomes inaudible. Then begin again at a point well beyond the hearing of the subject, and gradually approach him, until he is certain that he again hears the ticking. Note the distance. Repeat three times, and take the average of the six measures as the index of auditory acuity for the ear tested. Having finished testing one ear, change the position of the chair to the other end of the tape line, and proceed to test the other ear in the same manner.

Note. A certain type of child with unstable attention suffers from auditory illusions when listening attentively to hear the ticking, declaring that it hears, when it is highly improbable

that the ticking is audible. To make sure whether the child actually hears the watch, remove it silently, covering it in such a manner that the child can not possibly hear, and then ask again, "Do you hear it?" The question may be repeated until it is plain whether the child actually hears, or is guessing. If the subject insists under these conditions that he hears the watch, he reveals the unreliability of his judgment.

It becomes clear, therefore, that great care must be taken in administering this test, otherwise the results, especially with low-grade children who are frequently abnormally suggestible, become unreliable and worthless.

Since watches vary enormously in the strength and quality of their ticking, it is well to standardize the watch to be used by testing two or three persons known to have normal hearing, and to use the same watch in all subsequent testing.

The same suggestion holds with reference to the room in which the testing is to be done, as the reflection of sound from walls, floor and ceiling varies with every new position. Needless to say, the room should be free from disturbing noises while the testing is being done.

CHAPTER VII.

Bibliography.

The literature pertaining to the Binet-Simon tests now includes some hundreds of titles, many of which possess high scholarly merit. Limitations of space make it impossible to list here more than a small number of the more prominent publications. A complete annotated bibliography of books and papers bearing on the Binet-Simon Scale has just appeared in the *Journal of Educational Psychology*. See below, number 27 (Kohs, Samuel C., *J. of Educ. Psych.* 1914, vol. 5.)

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